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SPIROCHETAL ORGANISMS IN THE TISSUES IN ACUTE YELLOW ATROPHY OF THE LIVER

N. HAYASHI AND T. KIBATA

From the Department of Pathology of the College of Physicians and Surgeons, Columbia University, and the Pathological Laboratory of the Presbyterian Hospital, New York

In the course of our study of a typical case of acute yellow atrophy of the liver in the Presbyterian Hospital, New York, we have been able to demonstrate histologically the occurrence of a species of spirochete in the tissues. In view of the possible etiologic interest of the finding, its brief description will be given in the present paper.

MATERIAL AND METHODS

Material for the present study came from a man, 27 years old, admitted Oct. 13, who died Oct. 16, 1919. Clinically, the case was one of acute yellow atrophy of the liver with typical symptoms. The total duration of the illness was one week. Necropsy two hours after death, and microscopic examinations further demonstrated typical acute yellow atrophy of the liver. In addition, general jaundice, multiple capillary hemorrhages of the peritoneum, lung, liver, kidney, pelvis, stomach and duodenum, bronchopneumonia of the left lobule, and pleuritic adhesions, edema of the lungs, acute tubular nephritis, fatty liver, heart and kidney were noted.

Inoculation and cultures of postmortem material, made by Dr. Hideyo Noguchi, failed to demonstrate Leptospira ictero-hemorrhagica in this case.

Various tissues were stained by Giemsa as well as with the Levaditi methods, and were carefully examined microscopically.

Intestines.—Widely scattered in the necrotic tissue of the intestine were found groups of long threadlike organisms, measuring 10-12 microns, staining reddish violet with Giemsa stain. These elongated organisms were clearly brought out also by Levaditi stain.

Liver.—A number of rod or thread-like organisms, measuring 2-4 microns, similar to those that were seen in the intestine, were found in the necrotic tissue of the liver. In addition, numerous minute bodies of diplococcoid or diphtheroid type, were found intra- as well as inter-cellularly. These minute bodies show polar staining with

Received for publication Aug. 18, 1921.

Giemsa stain, resembling the Prowaschek's body in typhus. Morphologically, there is a series of forms which may be transitional between the long thread-like and coccoid forms. The coccoid body was not demonstrated by the Levaditi method.

Kidney.—The necrotic epithelium of the tubules showed typical examples of a spiral organism, in addition to the two types of bodies as seen in the liver. The spiral form is well stained by the Levaditi method and is seen to consist of 10-15 curves. It measures 8-25 microns (Fig. 4).

Pancreas.—Coccoid bodies were found in abundance, especially in association with blood vessels. Some of these bodies were slightly elongated, approaching the thread-like form seen in the liver (Fig. 3).

Through the kindness of Dr. Symmers, cases of epidemic acute hemorrhagic jaundice in the Bellevue Hospital, New York, have been studied for comparison. These cases in which Leptospira icterohemorrhagica could not be demonstrated directly or by inoculation have been reported by Dr. Symmers.[1] In 3 of 6 of these cases, we found three types of bodies similar to those that were just described. These bodies occurred in the pancreas, liver and intestine, but were particularly abundant in the kidney.

Control examinations have been made of normal human intestines (5 cases), normal guinea-pigs (10 cases), and the intestine of a man with an undetermined type of spirochetal infection. It has not been possible to demonstrate in any of this material the types of bodies that we found in the acute yellow atrophy of the liver.

DISCUSSION

That the coccoid body is not a bacterium may be judged from the occurrence of two or more chromatic spots and from the positive Levaditi reaction. It is more like the Prowaschek's body in typhus. Morphologic intergradation among the three types of bodies described suggests that they may represent stages in the life cycle of a single species of organism, namely, that of a spirochete. In connection with this assumption, it may be mentioned that Fry and Balfour[2] in the spirochetal infection of the fowl, and Kitogawa and Mukoyama,[3] in the rat-bite fever, have described the development of typical spiral organisms out of the granular forms.

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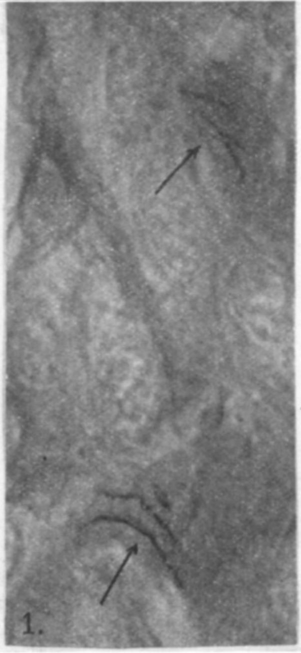
[1] Jour. Am. Med. Assn., 1920, 74, p. 1153.

[2] Parasitology, 1912.

[3] Arch. Int. Med., 1917, 20, p. 318.



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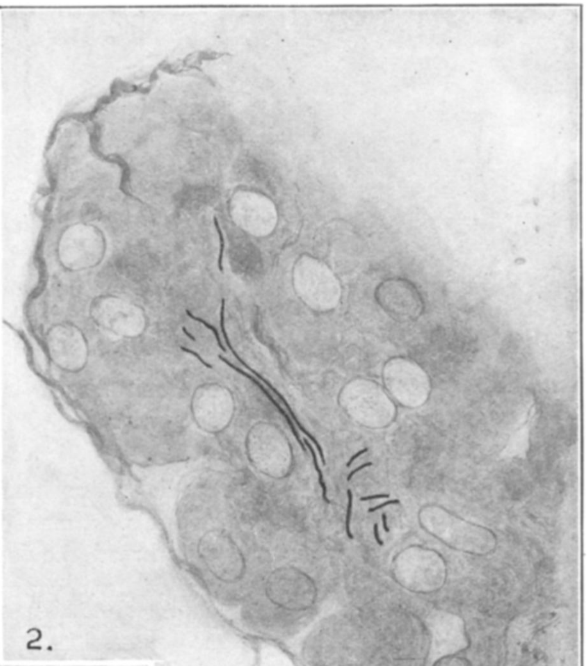

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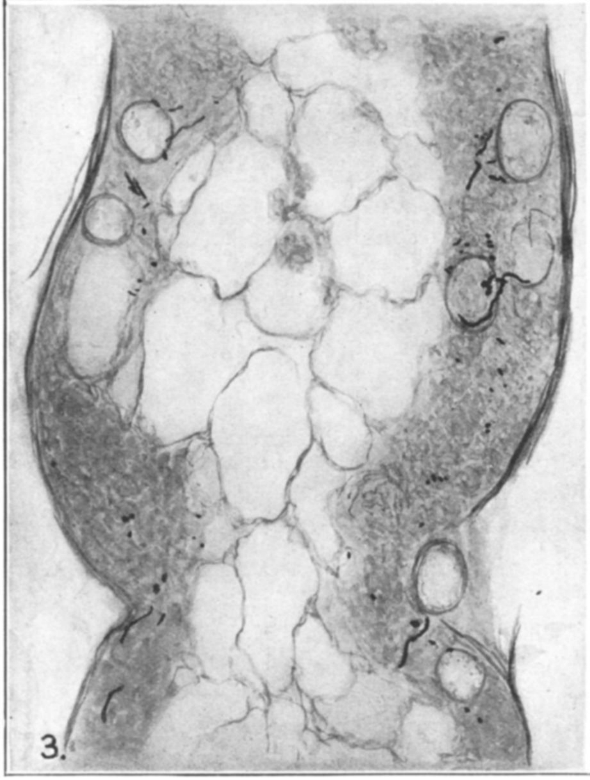

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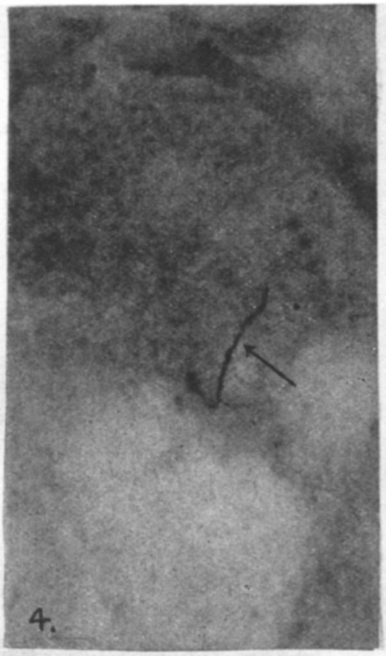

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Fig. 1.—Pancreas, showing about a dozen thread-like forms, and one typical spiral form. This illustration and fig. 2 were drawn from Levaditi material.

Fig. 2.—Kidney, showing several thread-like forms, in addition to coccoid ones, in the epithelium of the tubule. Some of the thread-like forms show curves.

Fig. 3.—Pancreas; several thread-like and spiral forms on the left. Three spirals on the right. This illustration and fig. 4 were photographed from Levaditi material.

Fig. 4.—Kidney; a typical spiral form with several curves.

It is not possible on the basis of the present findings alone to determine the etiologic significance of the spirochete in acute yellow atrophy of the liver. However, in view of the fact that the organism was most abundant in the liver, where the lesion was most prominent, and less abundant in the intestines, kidneys, and pancreas, which showed only slight lesions, it is at least conceivable that the organism may be etiologically related to the disease. It may be said as a general rule, that the relative abundance of an etiologic agent is parallel with the degree of severity of the lesion.

SUMMARY

What appears to be the stages in the life cycle of a species of spirochete have been demonstrated in the liver and certain other affected organs from a typical case of acute yellow atrophy of the liver. While the definite etiologic relation of the organism to the disease cannot at once be determined, the parallelism existing between the abundance of the organism and severity of the lesion suggests the probability of such a relation.